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**(54) Title:** CONTRACTIBLE SANITARY NAPKIN**(57) Abstract**

The present invention relates to absorbent articles, particularly sanitary napkins or panty liners, made for joining to the undergarment of a wearer. Such articles are typically joined to the undergarment of a wearer while the wearer has the undergarment stretched between the legs. In this stretched position, the undergarment has an extended surface. Upon pulling the undergarment up into the wearing position, the undergarment retracts and thereby causes the attached absorbent article also to retract. According to the present invention, the absorbent articles are rendered contractible at least in one of the directions of retraction of the undergarment to reduce wrinkling or folding of the absorbent article.

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## CONTRACTIBLE SANITARY NAPKIN

### Field of the Invention

The present invention relates to absorbent articles, particularly sanitary napkins or panty liners, made for joining to the undergarment of a wearer. Such articles are typically joined to the undergarment of a wearer while the wearer has the undergarment stretched between the legs. The undergarment is typically a pair of elastic, self-retractable, cloth or cloth-like underpants. In this stretched position, the undergarment has an extended surface. Upon pulling the undergarment up into the wearing position, the undergarment retracts and thereby causes the attached absorbent article also to retract. According to the present invention the absorbent articles are rendered contractible at least in one of the directions of retraction of the undergarment to reduce wrinkling or folding of the absorbent article.

### Background of the invention

It is known that absorbent articles which are worn in the undergarment of a wearer can be drastically improved if their positioning, structural integrity, and special adaptation to the particular wearing condition can be ensured at all times during use of such products. In this respect many developments have attempted to provide extensible, elastically extensible, highly flexible, or more generally, deformable absorbent articles which would help in providing the product with the ability to follow movements during use of a wearer.

It has therefore been thought in the prior art to utilize the above mentioned elements in ensuring proper fit of a disposable absorbent article, such as a sanitary napkin or panty liner, to create a product which is comfortable and well performing during use. Hence products which are adapted to follow movements during use have been developed over time. However, absorbent articles are typically not provided directly into the in-use wearing position, but are attached to the undergarment of a wearer while the undergarment is distorted. Typically the undergarment is put into a special mounting or application position, which is

not at all similar to that in which the undergarment will be, once the undergarment has been pulled up into the wearing position.

Typically sanitary napkins or panty liners are attached to an undergarment while that undergarment is in a pulled down position between the legs of a wearer. Usual undergarments are able to stretch and retract, i.e. elastically stretch in order to provide good comfort and proper fit while putting the undergarment on and during use of such an undergarment. In particular the crotch region of the undergarments is often rendered elastically stretchable in cross and longitudinal direction. Hence the undergarment in the pulled down position can be in an extended configuration. When the disposable absorbent article is applied the undergarment will retract, once it is pulled up into the use position.

This retractive movement of the undergarment can have several effects. One is that a relatively stiff article will delaminate across some of the attachment areas. Another effect is that a very flexible article will crumple and become distorted. However, it has been found that most articles behave somewhere between these extremes. they crumple and delaminate which will cause an unacceptable fit already at the beginning of the usage period.

It is hence an objective of the present invention to provide disposable absorbent articles, particularly sanitary napkins or panty liners which can provide good fit after undergoing the usual application procedure. It is a particular objective of the present invention to provide absorbent articles with a sustainable ability to follow the movements and stresses of the undergarment in order to maintain a wearer proximity approaching that of the undergarment itself. It is a particular objective of the present invention to provide absorbent articles which are able to contract initially when being placed in the wearing position due to external forces.

#### Brief description of the invention

The present invention relates to an absorbent article which is joined in use to the undergarment of a wearer. The article has a longitudinal axis and a

transverse or cross directional axis and comprises three main elements, namely a topsheet for liquid passage, a backsheet forming the outer surface which is facing the undergarment during use, and an absorbent core interposed between the topsheet and the backsheet. The absorbent article also has a panty fastening means which is provided on the outer surface of the backsheet in order to join the article to the undergarment of the wearer. The article according to the present invention is contractible at least in a direction parallel to the longitudinal axis, or parallel to the transverse axis, or a combination thereof. Since the retraction of undergarments is particularly important in a direction substantially parallel to the longitudinal axis of the disposable absorbent article, articles which can contract at least in this direction are preferred embodiments of the present invention.

Particularly preferred disposable absorbent articles are sanitary napkins or panty liners having a maximum thickness of less than 5 mm, preferably less than 2 mm thickness. In one embodiment according to the present invention the whole absorbent article comprising topsheet, backsheet, and absorbent core, is corrugated or pleated with the corrugation or pleats being parallel to the transverse axis of the absorbent article.

An absorbent article according to the present invention can comprise a release liner protecting the panty fastening means prior to use of the article. It is particularly preferred if this release liner is substantially non-extensible and non-contractible such that placing it on a corrugated or pleated absorbent article protects the corrugations or pleats during manufacturing, packaging, and transport of the absorbent article until it is put to use by delaminating the release liner prior to mounting the absorbent article into an undergarment.

It is also possible that one, several, or all the main elements of the absorbent article (topsheet, backsheet, and absorbent core) are elastically extensible while at least the non-elastically extensible element(s) is/are provided with corrugation or pleats substantially perpendicular to the same direction of extensibility of the elastically extensible elements of the product. This will provide the disposable absorbent article with the desired contractability while also providing elasticity to the article. Hence it is a particularly preferred embodiment of the present

invention when all the main elements of the article, mainly the topsheet, the absorbent core, and the backsheet, are individually and in their combination elastically extensible parallel to a longitudinal and transverse axis while the whole of the absorbent article is corrugated or pleated with the corrugation or pleats at least substantially parallel to the longitudinal axis of the absorbent article.

In a particularly preferred embodiment according to the present invention, the panty fastening means is provided by pressure sensitive adhesives which is preferably provided only to the corrugated or pleated outward facing surface of the backsheet, if the absorbent article was corrugated or pleated as a means to render it contractible.

#### Detailed description of the invention

The present invention will be described by reference to sanitary napkins or pantyliners. It is however equally well applicable to sanitary napkins or adult incontinence products which are worn in an undergarment and are joint to the undergarment during wearing of the absorbent product.

Absorbent products according to the present invention comprise typically three main components: a liquid pervious topsheet, a backsheet and an absorbent core. The absorbent core is enclosed by the backsheet and the topsheet and the product is worn such that the exposed surface of the topsheet faces the wearer of the absorbent product while the exposed surface of the backsheet faces the undergarment to which the product is joint by a panty-fastening attachment means. Typically this is an adhesive but could also be a mechanical attachment.

The present invention is concerned with the contractability of the product. The degree of contractability is determined by the selection of the materials for the components of the product as mentioned above, their respective quantity and to which extend they have been treated to provide contractability. It will be apparent to those skilled in the art that, in order to achieve the contractability according to the present invention, the selection of kind, quantity and treatment

of raw materials has to be balanced with other desired characteristics of the absorbent product such as for example absorbent capacity, absorption speed and surface dryness on the outside of the topsheet during use, and so on.

Therefore the following description of typical materials of the main components of the absorbent product will allow to provide a large number of product variants which satisfy the contractability requirements according to the present invention.

In addition to contractability the absorbent articles according to a preferred embodiment of the present invention are elastically stretchable. The term 'elastically stretchable', as used herein, means that when the stretching forces are removed, the article will tend to return toward its unextended or unstretched (or 'original' dimensions). It need not return all the way to its unstretched dimensions, however. If the absorbent article is elastically stretchable it may be stretchable in one or two directions (which are not-parallel) within the plane of the product i.e. essentially parallel to the garment facing surface.

Materials for contractible and elastically stretchable articles can be elastically stretchable per se or be treated so as to provide elastic stretchability. In particular elastic backsheet material, elastic topsheet material, filamentary materials combined with elastic strands, threads or webs as well as shirring, pleating or ring rolling of the materials may be employed in this context. Suitable material and methods are known in the art and e.g. disclosed in detail in US application 08/192240 of February 4, 1994 specifically referred to in order to facilitate selection of materials if stretchable absorbent articles according to the present invention are made.

In the following, non-limiting embodiments of the main elements of the absorbent product are described which can be employed in contractible and preferably also elastically stretchable or non-stretchable designs.

#### Absorbent core

The absorbent core typically includes the following components: (a) optionally a primary fluid distribution layer; (b) optionally, but preferably, a secondary fluid

distribution layer; (c) a fluid storage layer; (d) optionally a fibrous ("dusting") layer underlying the storage layer; and (e) other optional components.

a. Primary Fluid Distribution Layer

One optional component of the absorbent cores according to the present invention is the primary fluid distribution layer. This primary distribution layer typically underlies the topsheet and is in fluid communication therewith. The topsheet transfers the acquired menstrual fluid to this primary distribution layer for ultimate distribution to the storage layer. This transfer of fluid through the primary distribution layer occurs not only in the thickness, but also along the length and width directions of the absorbent product.

b. Optional Secondary Fluid Distribution Layer

Also optional but a preferred component of the absorbent cores according to the present invention is a secondary fluid distribution layer. This secondary distribution layer typically underlies the primary distribution layer and is in fluid communication therewith. The purpose of this secondary distribution layer is to readily acquire fluid from the primary distribution layer and transfer it rapidly to the underlying storage layer. This helps the fluid capacity of the underlying storage layer to be fully utilized.

c. Fluid Storage Layer

Positioned in fluid communication with, and typically underlying the primary or secondary distribution layers, is a fluid storage layer comprising certain absorbent gelling materials and/or other absorbent materials, which can form the carrier matrix for the absorbent gelling materials. Absorbent gelling materials are usually referred to as "hydrogels," "superabsorbent" "hydrocolloid" materials. Absorbent gelling materials are those materials that, upon contact with aqueous fluids, especially aqueous body fluids, imbibes such fluids and thus form hydrogels. These absorbent gelling materials are typically capable of absorbing large quantities of aqueous body fluids, and are further capable of retaining



such absorbed fluids under moderate pressures. These absorbent gelling materials are typically in the form of discrete, nonfibrous particles.

The fluid storage layer can comprise solely absorbent gelling materials, or these absorbent gelling materials can be dispersed homogeneously or non-homogeneously in a suitable carrier or it can comprise solely an absorbent carrier material.

Suitable carriers include cellulose fibers, in the form of fluff, tissues or paper such as is conventionally utilized in absorbent cores. Modified cellulose fibers such as the stiffened cellulose fibers can also be used. Synthetic fibers can also be used and include those made of cellulose acetate, polyvinyl fluoride, polyvinylidene chloride, acrylics (such as Orlon), polyvinyl acetate, non-soluble polyvinyl alcohol, polyethylene, polypropylene, polyamides (such as nylon), polyesters, bicomponent fibers, tricomponent fibers, mixtures thereof and the like. Preferred synthetic fibers have a denier of from about 3 denier per filament to about 25 denier per filament, more preferably from about 5 denier per filament to about 16 denier per filament. Also preferably, the fiber surfaces are hydrophilic or are treated to be hydrophilic. The storage layer can also include filler materials, such as Perlite, diatomaceous earth, Vermiculite, etc., that lower rewet problems.

If dispersed non-homogeneously in a carrier, the storage layer can be locally homogeneous, i.e. have a distribution gradient in one or several directions within the dimensions of the storage layer. Non-homogeneous distribution can also refer to laminates of carriers enclosing absorbent gelling materials partially or fully. If laminates are used they can be formed with or without absorbent gelling particles. In particular thermally bonded air laid fibrous sheets or laminates and/or thermally bonded wet laid sheets or laminates have been found useful, especially in the context of panty liners when no absorbent gelling material is used.

Preferably, the storage layer comprises from about 15 to 100% absorbent gelling materials and from 0 to about 85% carrier. More preferably, the storage

layer comprises from about 30 to 100 %, most preferably from about 60 to 100% absorbent gelling materials and from 0 to about 70 %, most preferably from 0 to about 40 %, carrier.

Suitable absorbent gelling materials for use herein will most often comprise a substantially water-insoluble, slightly crosslinked, partially neutralized, polymeric gelling material. This material forms a hydrogel upon contact with water. Such polymer materials can be prepared from polymerizable, unsaturated, acid-containing monomers. Suitable unsaturated acidic monomers for use in preparing the polymeric absorbent gelling material used in this invention include those listed in U.S. Patent 4,654,039 and reissued as RE 32,649. Preferred monomers include acrylic acid, methacrylic acid, and 2-acrylamido-2-methyl propane sulfonic acid. Acrylic acid itself is especially preferred for preparation of the polymeric gelling material. The polymeric component formed from the unsaturated, acid-containing monomers can be grafted onto other types of polymer moieties such as starch or cellulose. Polyacrylate grafted starch materials of this type are especially preferred. Preferred polymeric absorbent gelling materials that can be prepared from conventional types of monomers include hydrolyzed acrylonitrile grafted starch, polyacrylate grafted starch, polyacrylates, maleic anhydride-based copolymers and combinations thereof. Especially preferred are the polyacrylates and polyacrylate grafted starch.

While these absorbent gelling materials are typically in particle form, it is also contemplated that the absorbent gelling material can be in the form of macrostructures such as fibers, sheets or strips.

d. Optional Fibrous ("Dusting") Layer

An optional component for inclusion in the absorbent cores according to the present invention is a fibrous layer adjacent to, and typically underlying the storage layer. This underlying fibrous layer is typically referred to as a "dusting" layer since it provides a substrate on which to deposit absorbent gelling material in the storage layer during manufacture of the absorbent core. Indeed, in those instances where the absorbent gelling material is in the form of laminates or of macrostructures such as fibers, sheets or strips, this fibrous "dusting" layer need

not be included. However, because this "dusting" layer provides some additional fluid-handling capabilities such as rapid wicking of fluid along the length of the pad, its inclusion is typically preferred in absorbent cores according to the present invention.

e. Other Optional Components

The absorbent cores according to the present invention can include other optional components normally present in absorbent webs. For example, a reinforcing scrim can be positioned within the respective layers, or between the respective layers, of the absorbent cores. Such reinforcing scrims should be of such configuration as to not form interfacial barriers to fluid transfer, especially if positioned between the respective layers of the absorbent core. Given the structural integrity that usually occurs as a result of thermal bonding, reinforcing scrims are usually not required for the absorbent structures according to the present invention. If used however they have to allow the desired contractability.

Another component which can be included in the absorbent core according to the invention and preferably is provided close to or as part of the primary or secondary fluid distribution layer are odor control agents. These can be selected from active carbon or coated active carbon to conceal the color, suitable zeolite or clay materials, are optionally incorporated in the absorbent core also absorbent gelling material in combination with certain zeolites have been found useful. These components can be incorporated in any desired form but often are included as discrete, non-fibrous particles.

Topsheet

The topsheet is compliant, soft feeling, and non-irritating to the wearer's skin. As indicated above the topsheet material also can be elastically stretchable in one or two directions. Further, the topsheet is inherently fluid pervious permitting fluids (e.g., menses and/or urine) to readily penetrate through its thickness. A suitable topsheet can be manufactured from a wide range of materials such as woven and nonwoven materials; polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films;

porous foams; reticulated foams; reticulated thermoplastic films; and thermoplastic scrims. Suitable woven and nonwoven materials can be comprised of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polymeric fibers such as polyester, polypropylene, or polyethylene fibers) or from a combination of natural and synthetic fibers.

Preferred topsheets for use in the present are selected from high loft nonwoven topsheets and apertured formed film topsheets. Apertured formed films are especially preferred for the topsheet because they are pervious to body exudates and yet non-absorbent and have a reduced tendency to allow fluids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film that is in contact with the body remains dry, thereby reducing body soiling and creating a more comfortable feel for the wearer. Suitable formed films are described in U.S. Patent 3,929,135; U.S. Patent 4,324,246; U.S. Patent 4,342,314; U.S. Patent 4,463,045; and U.S. 5,006,394. Particularly preferred microapertured formed film topsheets are disclosed in U.S. patent 4,609,518 and U.S. patent 4,629,643. The preferred topsheet for the present invention is the formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company of Cincinnati, Ohio as "DRI-WEAVE."

Topsheets having not a homogeneous distribution of liquid passage ways but only a portion of the topsheet comprising liquid passage ways are also contemplated by the present invention. Typically such topsheets would have the liquid passage ways oriented such that they result in a centrally permeable and peripherally impermeable topsheet for liquids.

The body surface of the formed film topsheet can be hydrophilic so as to help liquid to transfer through the topsheet faster than if the body surface was not hydrophilic. In a preferred embodiment, surfactant is incorporated into the polymeric materials of the formed film topsheet such as is described in U.S. Patent Application Serial No. 07/794,745, filed on November 19, 1991. Alternatively, the body surface of the topsheet can be made hydrophilic by treating it with a surfactant such as is described in the above referenced U.S. 4,950,254.

### Backsheet

The backsheet prevents the exudates absorbed and contained in the absorbent core from wetting articles that contact the sanitary napkin such as pants, pyjamas and undergarments. The backsheet is preferably impervious to liquids (e.g., menses and/or urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials can also be used. The backsheet needs to be compliant and will readily conform to the general shape and contours of the human body. The backsheet preferably also can have characteristics allowing it to elastically stretch in one or two directions.

The backsheet can comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. Preferably, the backsheet is a polyethylene film having a thickness of from about 0.012 mm to about 0.051 mm.

Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio, under the designation P18-0401 and by Ethyl Corporation, Visqueen Division, of Terre Haute, Indiana, under the designation XP-39385. The backsheet is preferably embossed and/or matte finished to provide a more clothlike appearance. Further, the backsheet can permit vapors to escape from the absorbent structure (i.e., be breathable) while still preventing exudates from passing through the backsheet. In particular for pantliners or sanitary napkins having a low quantity of liquid to absorb according to their intended use it is possible to utilise apertured hydrophobic, polymeric films having directional liquid transport - such as those disclosed above for topsheets - towards the absorbent structure, as breathable backsheets.

### Contractability

According to the present invention the product as a whole allows a contraction of the product directly after having been applied to an undergarment in order to accommodate the initial stresses accerted upon the product by usual application methods. In order to accommodate that application situation when the

undergarment is stretched in one or both directions (relative to the absorbent structure longitudinal or transverse) it first needs to be considered whether a sanitary napkin is placed in the undergarment at this moment in a relaxed state or whether the undergarment itself also is pre-stretched to a certain extend.

This wholly depends on individual habits and practices of a user, therefore, no globally valid answer to this question can be given, however, it is believed that the condition in which the absorbent article is placed in an undergarment will be a different stress/strain situation than the undergarment to which it is fixed. It safely can be said that users may not pre-stretch the article but place it in the condition as provided to them into a stretched undergarment.

Some stretch can also be provided to articles in transverse directions if such articles have wings or side flaps which are folded around the crotch edge of the undergarment. In this folding process some users tend to pull on each of the wings such that the product is pre-stretched in transverse direction to certain extend. However, it is believed that under usual usage conditions neither a longitudinal nor a transverse pre-stretching occurs which exceeds that of the undergarment. Hence the need for contractability may vary depending on the application technique employed by the individual user but the basic requirement of contractability provides benefit to most users.

In order to provide contractability the absorbent article needs to be provided such that the materials employed allow contraction as for example in foam materials where contraction or extension can be accommodated based on the foamy structure of the material, or in a fibrous structure which allow contraction by deforming the inter fibrous contacts typically holding fibrous structures together. Hence it is possible to provide each of the main elements of an absorbent article with contractability on the basis of appropriate material selection. In this respect each individual component needs to provide at least the minimum desired contractability. Also the way in which the material are joined to each other, for example adhesive, needs to allow accommodation of such contraction in order not to represent the limiting contraction factor beyond the minimum desired contractability.

An alternative method to provide contractability is to allow for storage of access material in the direction of desired contraction. This can be provided by providing the material with a single or series of corrugations or pleats. Such corrugations or pleats will allow the product to deform at designated and designed places such that a contraction will not cause crumpling or disengagement of the panty fastening means from the undergarment but allow the product to accommodate the external stresses accerted by the contracting undergarment in a designed fashion, namely by contracting as desired. Such corrugations or pleats can be provided in longitudinal direction or transverse direction or in both longitudinal and transverse direction rendering the product contractible in one or the other or both directions respectively.

It is of course also possible to combine inherent material contractability with the structural contractability provided by corrugations or pleats. The term "corrugated or corrugations" as used herein designates the existence of a series of continuous changes of the normal direction of a plain of a sheet. The "normal direction" of a plain is the direction perpendicular to that plain. While corrugations are a continuous change of the normal direction in the plain of a sheet the term "pleats" or pleated" as used herein refers to foldings along a specific line or, in other words, an uprpt change in the normal direction of a plain of a sheet. A series of pleats can also be used to simulate corrugations and from a theoretical point of view corrugations are approached by an infinite number of pleats.

In particular for pantliners a process termed ring-rolling can be employed upon the whole product to provide structural corrugations allowing for contractability of the product as desired. Such ring-rolling at least in a high speed manufacturing operation does require the materials to be carefully selected by a man skilled in the art which however is no problem given the above material choices and a desired contractability in mind. Ring-rolling of individual materials prior to combination can also be useful in order to provide products in addition to their contractability having a flexibility and softness improvement over usual products. Ring-rolling is described in more detail in US 4, 107, 364, US 4, 834, 741, US 5, 156, 793, US 5, 143, 679, US 5, 167, 897 and US 5, 354, 400 which gives a detailed explanation how to provide differential extensibility as well.

Also corrugating is well-known and will be easily usable for those skilled in the art. Corrugations may be present in both longitudinal and transverse direction of the absorbent article, however, corrugation techniques have been developed to provide corrugations which are transverse to the direction of material transport during manufacturing of an article. Hence a ring-rolling operation can be considered to provide corrugation in the direction of transport of a material during manufacturing while a corrugation process would typically provide only corrugation in the perpendicular direction.

However, the term corrugations or pleats as used herein does refer to the result of ring-rolling or corrugating irrespective of whether the process was used in the direction of transport of a material during manufacturing or perpendicular thereto.

The required extend of corrugation or pleats (defined by amplitude and frequency) can easily be defined by simple trial and error to accommodate the required contractility. It will depend on the combined thickness and flexibility of the article. Those skilled in the art will also realize that the same corrugation or pleats can be provided such that they allow different extends of contractility depending on whether they have been flatered again or not. In particular the total contractibility can be increased by stretching the corrugated or pleated portions of an article perpendicular to the lines of corrugation or pleating.

#### The panty-fastening-adhesive

The backsheet typically forms the garment facing surface on which the panty fastening adhesive is placed.

Panty-fastening-adhesives can comprise any adhesive or glue used in the art for such purposes with pressure-sensitive adhesives being preferred. Suitable adhesives are Century A-305-IV manufactured by the Century Adhesives Corporation, Instant Lock 34-2823 manufactured by the National Starch Company, 3 Sigma 3153 manufactured by 3 Sigma, and Fuller H-2238ZP



manufactured by the H.B. Fuller Co. Suitable adhesive fasteners are also described in U.S. Patent 4,917,697.

Other suitable panty-fastening-adhesives are shown in PCT International Patent Publication No. WO 92/04000; WO 93/01783 and WO 93/01785.

It should be understood that since it is desired to make the component that forms the garment facing surface of the sanitary napkin (and any overlying components) contractible in the wearer's panties, the particular adhesive needs to support this ability. The panty fastening adhesives are preferably applied in intermittent patterns such as for example intermittent dots, intermittent strips, random or designed filamentary patterns to permit the sanitary napkin to contract and/or extend.

In addition to adhesives, other types of fasteners can be used instead of , or in addition to adhesives. These other types of fasteners are arranged in patterns similar to those of the adhesive. Such fasteners include, but are not limited to conventional VELCRO hook material or similar fasteners.

The optional protective side flaps can have optional fasteners thereon for additional security. The optional protective side flap fasteners can be any of the types of fastening materials herein above. The fasteners assist the protective side flaps in staying in position after they are wrapped around the edges of the crotch surface of the protective side flaps.

Prior to use of the absorbent article the panty fastening adhesive is typically protected from contamination and from sticking to any surface where this is not desired by a protective cover means such as a silicone coated release paper, a plastic film or any other easily removable cover. The protective cover means can be provided as a single piece or in a multitude of pieces e.g. to cover the individual adhesive areas.

In particular for embodiments according to the present invention having corrugations or pleats in the backsheet (or in the whole product) it is desirable to provide the panty fastening adhesive only on those portions of the corrugation or pleats directed outward from the article (i.e. those parts of the backsheet

making first contact with the undergarment upon use of the article). On these embodiments the protective cover means is preferably a non-extensible and non-contractible material. It will then protect the adhesive and maintain the article in its corrugated or pleated condition until removal of the cover means. In this context the above mentioned release papers have been found most useful.

**WHAT IS CLAIMED IS:**

- 1.) An absorbent article for joining to the undergarment of a wearer, said article having a longitudinal axis and a transverse axis comprising
  - a topsheet having liquid passage ways;
  - a backsheet having an outer surface which is facing said undergarment during use;
  - an absorbent core interposed between said topsheet and said backsheet;
  - a panty fastening means, said panty fastening means being provided on said outer surface of said backsheet;said article being characterised in that
  - said article is contractible in a direction selected from parallel to said longitudinal axis or parallel to said transverse axis or combinations thereof.
- 2.) An absorbent article according to claim 1 wherein said article is contractible only in a direction substantially parallel to said longitudinal axis.
- 3.) An absorbent article according to any of the preceding claims wherein said article is a panty liner or sanitary napkin and said article has a maximum thickness of less than 5 mm, preferably less than 2 mm.
- 4.) An absorbent article according to any of the preceding claims wherein said article further comprises a release liner protecting said panty fastening means prior to use of said article and wherein said topsheet, said backsheet and said absorbent core are corrugated or pleated with the corrugations or pleats being parallel to said longitudinal axis.
- 5.) An absorbent article according to claim 4 wherein said release liner is substantially non-extensible and non-contractible so as to maintain said corrugations or pleats during manufacturing, packaging and transport of said article until use of said article.
- 6.) An absorbent article according to any of the preceding claims wherein at least one of said topsheet, said backsheet or said absorbent core is elastically extensible and the non-elastically extensible of said topsheet, said backsheet or

said absorbent core is in a corrugated or pleated form with the corrugations or pleats being substantially parallel to said transverse axis.

7.) An absorbent article according to claim 6 wherein the whole of said article is elastically extensible, preferably each of said topsheet, said core and said backsheet are individually and in their combination elastically extensible, and the whole of said article is corrugated or pleated with the corrugations or pleats being substantially parallel to said longitudinal axis.

8.) An absorbent article according to claim 7 wherein said article further comprises a release liner protecting said panty fastening means prior to use of said article wherein said release liner is substantially non-extensible and non-contractible so as to maintain said corrugations or pleats during manufacturing, packaging and transport of said article until use of said article.

9.) An absorbent article according to any of the preceding claims wherein the panty fastening means is a pressure sensitive adhesive.

10.) An absorbent article according to claim 9 wherein the whole of said article is corrugated or pleated with said pressure sensitive adhesive being applied to the outward facing portions of said corrugated or pleated outer surface of said backsheet.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/06480

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :A61F 13/15

US CL :604/385.2, 387

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.1, 385.2, 386, 387

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,940,462 A (SALERNO) 10 July 1990, figures.	1, 2 ----- 3
X --- Y	US, 4,911,701 A (MAVINKURVE) 27 March 1990, figures.	1, 2 ----- 3
X --- Y	US 5,037,417 A (TERNSTROM et al) 06 August 1991, figures.	1, 2 ----- 3

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X*	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y*	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z*	document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means		
*P* document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

22 MAY 1997

Date of mailing of the international search report

12 JUN 1997

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US97/06480

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 4-10  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US97/06480

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,389,094 A (LAVASH et al) 14 February 1995, Figs 2 and 14; col. 6, lines 31-25; and col. 7, lines 40-45.	1, 2 ----- 3
Y	US 4,950,264 A (OSBORN, III) 21 August 1990, col. 15, lines 15-59.	3